भारतीय मानक
Indian Standard

IS 8391 (Part 3) : 2019

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भाग 3 सैंडविच

(तीसरा पुनरीक्षण)

Rubberized Coir Sheets for Cushioning — Specification

Part 3 Sandwiched

(Third Revision)

ICS 55.040; 59.060.10; 59.080.40

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FOREWORD

This Indian Standard (Part 3) (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Coir and Coir Products Sectional Committee had been approved by the Textile Division Council.

This standard was first published in 1977 and further revised in 1987 and 2018. Further it has now been revised to incorporate the additional requirements for Eco-mark.

Sandwiched Rubberized Coir (SRC) sheets are cushioning product manufactured from suitable polyurethane/ orlatex foam rubber sheet between two rubberized coir/needle felt coir sheets with natural or synthetic or a combinationof both binders. In general, this indigenous technology used to manufacture sandwiched rubberized coir sheetsfor cushioning is an improved combination of that of the existing rubberized coir industry.

Curled coir fibres are suitably coated and bonded with natural or synthetic rubber or a combination of both containing suitable ingredients and vulcanized for the final set to make uniform mat in different density according to requirement. Polyurethane or latex foam sheet sandwiched with rubberized coir/needle felt coir sheets by the application of latex to get uniform bonding between the sandwiched materials. Sandwiched rubberized sheets shall be of resilient nature and porus structure in the form of fabricated sheets.

The Ministry of Environment and Forests, Government of India has instituted a scheme for labelling environment friendly products known as 'Eco-mark scheme' and notified *vide* Gazette Notification No. 893(E), dated 18 September 2018 for labelling Coir and Coir products as environment friendly.

The Eco-mark scheme is being operated by the Bureau of Indian Standards. However, to obtain the licence to use the Ecomark on a product, it is also essential to obtain BIS licence to use the Standard Mark as per the relevant Indian Standard for that product.

The composition of the committee responsible for the formulation of this standard is given at Annex M.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

RUBBERIZED COIR SHEETS FOR CUSHIONING —SPECIFICATION

PART 3 SANDWICHED

(Third Revision)

1 SCOPE

1.1 This standard (Part 3) prescribes the requirements and methods of test for sandwiched rubberized coir sheets for cushioning.

1.2 It does not cover articles made from shreddedrubberized coir or fabricated articles consisting of a cover of sandwiched rubberized coir sheets enclosing springs or other cushioning material, or industrial and packaging material.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subjected to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A**.**

3 TERMS AND DEFINITIONS

For the purpose of this standard, the following definitions shall apply.

3.1 Rubberized Coir — A resilient product of porousstructure containing curled coir fibre suitably coated and bonded with natural rubber, synthetic rubber or a combination of both containing suitable ingredients, and vulcanized for the final set to the desired size and shape.

3.2 Needle Felt Coir Mats — Aresilient product ofporous structure containing needle felt coir (non-woven process) suitably coated and bonded with natural rubber or synthetic rubber or a combination of both containing suitable ingredients, and vulcanized for the final set to the desired size and shape.

3.3 Polyurethane Foam — Flexible polyurethane foam of polymer or polyester type, which is described as expanded cellular product produced by interaction of poly-hydroxy compounds, water and isocyanate. The form shall consist of cells of uniform characteristics, which are essentially open and interconnecting.

3.4 Latex Foam — A cellular rubber made directly from liquid latex and in which all the cells are intercommunicating having a vulcanized cellular structure with a porous surface. The cells shall be of a uniform character.

3.5 Sandwiched Rubberized Coir Sheets (SRC) — Cushioning block obtained by enclosing suitable polyurethane and/or latex foam rubber sheet of suitable thickness and density between two rubberized Coir/ Needle felt coir sheets and described in **5.1**, or a combination of such blocks.

3.6 Indentation Hardness Index —The indentation hardness index is the load in kilograms required to produce an indentation in the sample equivalent in depth to 40 percent of the original thickness of the sample with a cross-section of 1 square decimeter.

3.7 Original Thickness —The thickness determined by needle gauge method for the whole sample will be termed as original thickness.

NOTE — For sample having thickness less than 38 mm, the original thickness shall be determined by superimposing minimum number of pieces to give a total thickness of about 38mm and the average taken as the original thickness of the sample.

4 GRADES

The sandwiched rubberized coir sheets for cushioning shall be graded on the basis of the indentation hardness index and density as given below:

Grade	*Indentation Hardness Index*	*Density, Min* g/dm^3
Medium	4.00-4.99	50.0
Firm	5.00-5.99	60.0
Extra firm	6.00-6.99	70.0

NOTE — The tolerance on indentation hardness index has been provided to take care of the agreement between the purchaser and the manufacturer in respect of this requirement when it is desired to have different value in any portion of the coir sheet.

5 MANUFACTURE, WORKMANSHIPAND FINISH

5.1 Sandwiched rubberized coir sheets shall be manufactured using un retted coir fibre mechanically extracted by regulated and even feeding of the fibres with the help of a mechanical arrangement in curling machines to form a thick strand of evenly distributed parallelized fibres which is processed further to form twisted curled coir rope as per IS 9308 (Part 4) for effectively utilize the resiliency of the fibre material, the fibres being bonded to each other by vulcanized rubber to keep them in position, utilizing rubber latex containing compounding ingredients of such nature and quality that the finished product complies with the requirements of this specification.

Alternatively, coir fibres manufactured by mechanical process as per IS 9308 (Part 2) or IS 9308 (Part 3) are processed through needled felt plant (Non-woven system) to make uniform mat in different densities according to the requirement. The non-woven mats produced are bonded with natural rubber or synthetic rubber or a combination of both containing compounding ingredients of such nature and quality. Then the fleeces of mats are pressed into pad by passing into a press under controlled temperature, pressure and time that the finished product complies with the requirements of this specification.

5.2 The rubberized coir/needle felt coir sheets shall be sandwiched with either polyurethane or latex foam or the combination of the both for a sandwiched sheet. Polyurethane or latex foam sheet sandwiched with rubberized coir/needle felt coir sheets by the application of latex to get a uniform bonding between the sandwiched materials. The side walls of the sheets after cutting to the desired dimensions shall be bonded by latex compound with Hessian cloth or tapestry or any other suitable material so as to provide additional support, if necessary.

5.3 Sandwiched rubberized coir sheets shall be of a resilient nature and porous structure, in the form of sheetings or fabricated sheets. Any special characteristics other than those prescribed in this specification which may be desired for specific application shall be as agreed to between the purchaser and the supplier.

5.4 The sandwiched rubberized coir sheets shall present an uniform appearance throughout the structure and shall not contain loose fibres or voids.

5.5 Due to manufacturing conditions, the material may have to be altered or repaired. The repaired or altered material shall be acceptable provided the material used in such repairs or alterations is of the same composition and quality as the original product and provided such alterations do not affect the requirements given in this specification. The odour of sandwiched rubberized coir shall be as mild as possible and shall not be objectionable.

5.6 Toppings of natural foam or synthetic foam or combination of both may be bonded to sandwiched rubberized coir sheets for a smoother surface as agreed to between the purchaser and the supplier.

5.7 Thickness of the latex foam/polyurethane foam shall not exceed the total thickness of rubberized coir/ rubberized needle felt coir sheet for manufacture of sandwiched rubberized coir.

6 SHAPE AND DIMENSIONS

6.1 Sandwiched rubberized coir sheets may be supplied in fabricated shapes or in sheet form as specified by the purchaser.

6.2 The dimensions of sandwiched rubberized coir sheets, when tested according to the method prescribed in Annex B shall be as specified by the purchaser subject to the tolerance as given below:

Length or Width	***Permissible Tolerance***
	mm
Up to 1 m	**± 6**
1 m to 1.5 m	**± 9**
Over 1.5 m	**± 12**

Thickness	*Permissible Tolerance*
	mm
Up to 12mm	+ 3
	- 0
Over 12mm up to 38 mm	+ 6
	- 3
Over 38 mm up to 100 mm	+ 12
	- 6
Over 100 mm	+ 15
	- 6

7 REQUIREMENTS

7.1 Density

Density requirement is optional and has been given for guidance only. The density corresponding to various grades is as given in **4**. The method of test shall be as given in Annex C.

7.2 Indentation Hardness

When tested according to method given in Annex D, different grades of sandwiched rubberized coir

products shall have the indentation hardness as prescribed under **4**.

7.3 Resistance to Ageing

When tested according to method prescribed in Annex E, the indentation hardness of the sample after ageing shall not vary by more than ±10 percent of the value obtained with unaged sample.

7.4 Resistance to Flexing

When tested according to the method given in Annex F, the indentation hardness of the test specimen shall not vary by more than ±10 percent. This shall be calculated on the resultant thickness.

7.5 Compression Set (Aged)

The compression set of the sample, when determined by the method prescribed in Annex G, shall not exceed ± 15 percent. This shall be calculated on the resultant thickness.

7.6 Compression Set (Un-aged)

The compression set of the sample, when determined by the method prescribed in Annex G, tested under atmospheric conditions without the elevated temperature, shall not exceed ±10 percent.

7.7 *p*H Value

The *p*H value of the aqueous extract of rubberized coir when determined by the method prescribed in Annex H shall be within 5 to 8.5.

7.8 Chloride Content

The chloride content of the rubberized coir calculated as 'Cl' when determined by the method prescribed in Annex J shall not exceed 0.3 percent by mass.

7.9 Sulphate Content

Sulphate content of the aqueous extract of the material prepared as in **H-2** and tested by the method prescribed in Annex K shall not exceed 0.2 percent by mass.

8 TESTS

8.1 Preparations and Conditioning of Samples

8.1.1 Wherever practicable, the tests shall be conducted on the whole sandwiched rubberized coir sheet.

8.1.2 The specimen shall be cut from the centre of the sample piece as far as possible and the specimen shall be subjected to test, preferably within 24 h of cutting.

8.1.3 When the finished product does not lend itself to testing or to the preparation of test pieces because of complicated shape, small size or other reasons, standard test slabs shall be prepared.

8.1.4 When differences due to the difficulty in obtaining suitable test pieces from the finished product arise, the manufacturer and the purchaser may agree on acceptable deviations. This can be done by comparing results of standard test pieces and those obtained on actual product.

8.1.5 Test shall be carried out not before 24 h after vulcanization of the sample. Sample and test pieces shall be protected from light as far as possible and from any stress or strain, whenever they are not actually in the process of being tested.

8.1.6 *Conditioning*

Each sample selected for test shall be conditioned for a minimum period of 24 h at 27 ± 2°C and 65 ± 5 percent relative humidity (*see* IS 6359) prior to testing and testing shall be in the same atmosphere, when the testing cannot be carried out in the same atmosphere then the testing shall be commenced within 2 min of withdrawal of specimen from the conditioning atmosphere.

9 ADDITIONAL REQUIREMENTS FOR ECOMARK (OPTIONAL)

9.1 The product shall meet the requirement specified in this Indian Standard.

9.2 The manufacturer shall produce the consent clearance as per the provisions of *Water (Prevention and Control of Pollution) Act,* 1974 and *Air (Prevention and Control of Pollution) Act,* 1981 and the authorization(s), if required under the rules notified under the *Environment (Protection) Act*, 1986 and the rules made there under while applying for the Eco-markas per *Bureau of Indian Standards Act*, 2016.

9.3 The product(s) or product packaging(s) may display in brief the criteria based on which the product(s) has/ have been labeled environment friendly.

9.4 The material used for product packaging(s) shall be recyclable, reusable or biodegradable.

9.5 The product shall meet the specific requirements as given in Table 1.'

Table 1 Specific Requirements for Ecomark

(*Clause* 9.5)

Sl No.	Parameter	Requirement	Method of Test
(1)	(2)	(3)	(4)
i)	Residual pesticides (Sum parameter) (ppm) (*Max*)	1.0	IS 15651
ii)	*p*H of aqueous extract	6-7	IS 8391 (Part 1)

10 SAMPLING

10.1 Lot

All sandwiched rubberized coir sheets of the same grade, size and shape manufactured under similar conditions shall constitute a lot.

10.2 Sample

That part of the lot which is drawn randomly to represent the lot.

10.3 Test Specimen

An appropriately shaped piece taken from the sample for use in physical and chemical tests.

11 MARKING OR LABELLING

11.1 Each sandwiched rubberized coir sheets for cushioning shall be attached with a label bearing the following information:

a) Name of the material;
b) Manufacturer's name, initials, trade-mark or any other identification mark;
c) Grade;
d) Dimensions; and
e) Criteria for which sandwiched rubberized coir sheets has been labeled as Eco-mark; and
f) Any other information required by the buyer or by the law in the force.

11.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act,* 2016 *and* the Rules and Regulations framed there under, and the products may be marked with the Standard Mark.

12 PACKING

The sandwiched rubberized coir sheets shall be packed as agreed to between the purchaser and the supplier.

13 INSTRUCTIONS FOR STORAGE

Sandwiched rubberized coir sheets shall be kept in well ventilated store in an atmosphere free from the products of combustion from any heating appliance and free solvent vapours, out of contact with damp surfaces. Under no circumstances shall the products be stored in direct sunlight or exposed to ultraviolet light. When products are stacked in stores, care shall be taken to avoid undue compression or distortion. Special care shall be taken when staking fabricated products of irregular shape.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1070 : 1992	Reagent grade water — Specification (*third revision*)
711 : 1979	Specification for direct reading *p*H meters (*second revision*)
6359 : 1971	Method for conditioning of textiles
15651 : 2006	Textiles — Requirements for environmental labelling — Specification
9308	Specification for mechanically extracted coir fibre
(Part 2) : 1987	Mattress coir fibre (*first revision*)
(Part 3) : 1987	Decorticated coir fibre (*first revision*)
15651 : 2006	Textiles — Requirements for environmental labelling — Specification
8391 (Part 1) : 2019	Rubberized coir sheets for cushioning — Specification: Part 1 Curled (*second revision*)

ANNEX B

(*Clause* 6.2)

METHOD OF TEST FOR MEASUREMENT OF DIMENSIONS

B-1 DETERMINATION OF LENGTH AND WIDTH

Measure the length and width of the sample using a steel rule nearest to 1 mm, ensuring the measurement along a line perpendicular to opposing faces of the sample.

B-2 DETERMINATION OF THICKNESS

B-2.1 A test specimen 100 × l00 mm cut out from the sample shall be placed between two larger horizontal plates with a load of 200 g on its upper surface. The distance between the plates is determined at about the middle on each side correct to the nearest mm and the average of the four readings taken as the thickness of the sample.

B-2.2 Determination of Thickness of the Whole Sample

The instrument for measuring the thickness consists of a 250 mm long, rigid, narrow measuring needle made out of the suitable material and finished to give a smooth polished surface, one end of which is fixed vertically to the centre of a polished plate of 3mm thickness and 50 × 50 mm size, the other end being tapered to a point, to facilitate insertion of the rod through the rubberized coir sheet. The needle is calibrated in millimeter all along its length starting with the point fixing it with the plate as 0, every 5 and 10 mm from this point being prominently marked out. A disc of 35 mm diameter, weighing 200 g with a central hole to facilitate movement of the weight all along the length of the calibrated needle also forms part of the measuring instrument.

B-2.2.1 *Procedure*

For measuring the thickness of the sample, the calibrated needle measuring instrument is inserted through the bottom side of the sandwiched rubberized coir sheets, so that the needle is in a plane perpendicular to the free surface of the sandwiched rubberized coir sheets and the base plate of the instrument is in contact with the bottom side of the sandwiched rubberized coir sheets. Thereupon, the sliding weight is introduced on the projecting part of the needle and the combined thickness of the sandwiched rubberized coir sheets and that of the sliding weight read directly, correct to the nearest 1 mm, on the calibrated needle. The thickness of the sliding weight is deducted from this reading to obtain the thickness of the test sample. The measurements are recorded at last at four points at random on the test piece and the average value taken as the thickness of the test material.

ANNEX C

(*Clause* 7.1)

METHOD FOR DETERMINATION OF DENSITY

C-1 Determine the length, width and thickness of the sample as described in Annex B.

C-1.1 Weigh the test specimen correct to 0.1 g.

C-1.2 Determine the density of the sample by dividing the mass in grams by the volume in cubic decimetres.

ANNEX D

(*Clause* 7.2)

METHOD FOR DETEMINATION OF INDENTATION HARDNESS INDEX

D-1 TEST SPECIMEN

Cut out a test specimen measuring 100 × 100 mm, leaving a space of 25 mm from the edges of the whole piece.

D-2 APPARATUS

D-2.1 The testing apparatus shall be capable of applying an indentation in such a way that the load is applied on the sample at a uniform rate through a load measuring device of suitable capacity for measuring the load required to produce the specified indentation. The sample shall be placed on the smooth flat horizontal surface of the platform of the load measuring device, the surface of the platform being larger than the size of the sample.

D-2.2 The essential parts of the testing apparatus (*see* Fig. 1) are an adjustable indentor of the dimension specified in **D-2.2.1**, which can be moved vertically up or down by a threaded shaft, working through a sleeve of same pitch and dimension, operated by a hand wheel. The sleeve is fitted to a framework which rests on the horizontal surface of a table without having contact with the load measuring device of minimum 20 kg capacity with accuracy of 10 g. The thickness of the sample can be measured by means of a pointer mounted on the indenter with suitable guides and sliding in front of a vertical scale graduated in millimetre. The pointer is so adjusted that when the indentor touches the platform of the balance, the reading of the pointer on the scale is zero.

D-2.2.1 *Indentor*

A 105 mm square mild steel plate of 3 mm thickness shall constitute the indentor, fitted to the threaded shaft by a ball and socket joint, so that the surface of the indentor can adjust itself to the contour of the test specimen.

D-3 TEST PROCEDURE

The test specimen shall be of size minimum 100 × 100 mm. Raise the indentor to a height greater than the thickness of the sample and place the sample over the platform of the load measuring device below the indentor. Note the weight of the sample recorded by reading on the load measuring device (x g). Lower the indentor by rotating the handle so as to press the sample against the platform of the load measuring device. When the load measuring device reads (200 g + x g), note the reading of the pointer on the scale to record the thickness of the sample (t_1). Gradually lower the indentor to apply a load at the rate of 0.5 kg/min until the sample is pressed to a thickness of 60 percent of t_1. The load recorded on the load measuring device for this indentation is taken as the indentation Hardness Index of the specimen.

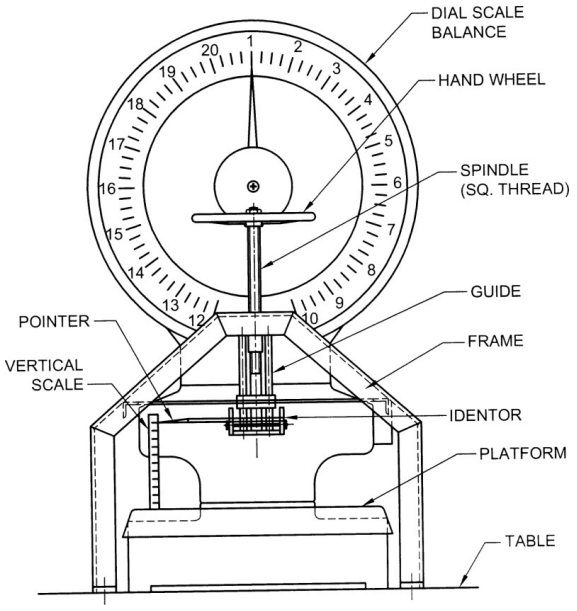

FIG. 1 APPARATUS FOR IDENTATION TEST

ANNEX E

(*Clause* 7.3)

METHOD FOR DETERMINATION OF RESISTANCE TO AGEING

E-1 PRINCIPLE

The ageing test consists of subjecting samples to controlled deterioration by air at elevated temperature and atmospheric pressure after which the physical properties are measured and compared with those of un-aged samples. The deterioration is measured and compared with those of un-aged samples. The deterioration is measured by the observed change in indentation hardness index.

E-2 TEST SPECIMEN

From each sample cut out two test specimens of size 100 × 100 mm and measure the indentation hardness index (I_1) as specified in Annex D.

E-3 PROCEDURE

E-3.1 Select an air oven of such size that the totalvolume of test specimens does not exceed 10 percent of the free space in the oven. Make provision for suspending specimens so that they are not within 12 mm of each other or the oven sides. Control the temperature of the oven thermostatically so that the test specimens are kept at 70 ± 2°C. Place thermometer near the centre of the oven to record the actual ageing temperature.

E-3.2 Adjust the oven to 70 ± 2°C. Place the testspecimens in the oven adjusted as indicated in **E-3.1**. Arrange the test specimens so that they are stationary, free from strain, freely exposed to air on all sides and not exposed to light. Continue the ageing for 48 h. At the completion of the ageing period, remove the test specimens from the oven and place on a flat surface to cool to room temperature. Allow them to cool for not less than 24 h. Measure the indentation hardness index (I_2) of the aged specimens as in Annex D.

E-3.3 Compare the indentation hardness index of bothaged and un-aged test specimens.

E-4 CALCULATION

Calculate the resistance to ageing as follows:

$$\text{Resistance to ageing, percent} = (I_1 - I_2) / I_1 \times 100$$

Where,

I_1 = Indentation hardness index of the original sample, and

I_2 = Indentation hardness index of the aged sample.

ANNEX F

(*Clause* 7.4)

METHOD FOR DETERMINATION OF RESISTANCE TO FLEXING

F-1 METHOD

The method involves subjecting a sample to continued flexing with an indentor for 2 50 000 cycles at 4 cycle/s and measuring the loss/gain in indentation hardness.

F-2 TEST SPECIMEN

Cut out a test specimen measuring 100 × 100 mm, leaving 25 mm from the edges of the whole piece.

F-3 APPARATUS

F-3.1 The essential parts of the apparatus (*see* Fig. 2), which has been found suitable, consists of an indentor of dimensions specified in **F-3.2**, connected through a threaded adaptor and held by a locking nut to a push rod. This push rod is constrained to move vertically by fixed sleeves and is driven vertically by a motor which rotates a crank disc, the crank disc and push rod being joined by a connecting rod. This connecting rod is adjustably mounted in a radial slit in the crank disc, the length of the strokes, therefore, being adjustable. The motor is mounted upon a steel beam above the table upon which the specimen to be tested is placed. A square frame made of mild steel angles with a clear internal dimension of 107 × 107 mm is positioned on the table just below the indentor to prevent lateralmovement of the specimen in the course of its repeated flexing by the indentor. The fixtures are adjusted for effecting four flexes per second. A revolution counter is attached to the machine to record the number of flexes for the specimen.

F-3.2 A 105 mm square mild steel plate of 3 mm thickness shall constitute the indentor.

F-4 PROCEDURE

Measure the thickness of the sample as described in AnnexB. Determine the indentation hardness index (I_1) as given in Annex D. Adjust the stroke of the crankshaft for a depression of the indentor by a distance equal to 40 percent of the thickness of the sample. This is done by adjusting the position of the connecting rod in the crank disc. Raise the indentor to the top most position of the stroke and the test specimen in the mild steel angle box below the indentor. Place wooden blocks of suitable thickness below the specimen to ensure that the top surface of the specimen is in contact with the bottom side of the indentor when the indentor is at the topmost position of the stroke. Subject the specimen to flexing at a rate of 4 cycle/s. After flexing 2 50 000 cycles, allow the sample to remain for 30 min. Thereafter, determine the indentation hardness index (I_2) by test method prescribed in Annex D.

F-5 CALCULATION

Calculate the resistance to flexing as follows:

Resistance to flexing, percent = $(I_1 - I_2) / I_1 \times 100$

Where,

I_1 = Indentation hardness index of the original sample, and

I_2 = Indentation hardness index of the flexed sample.

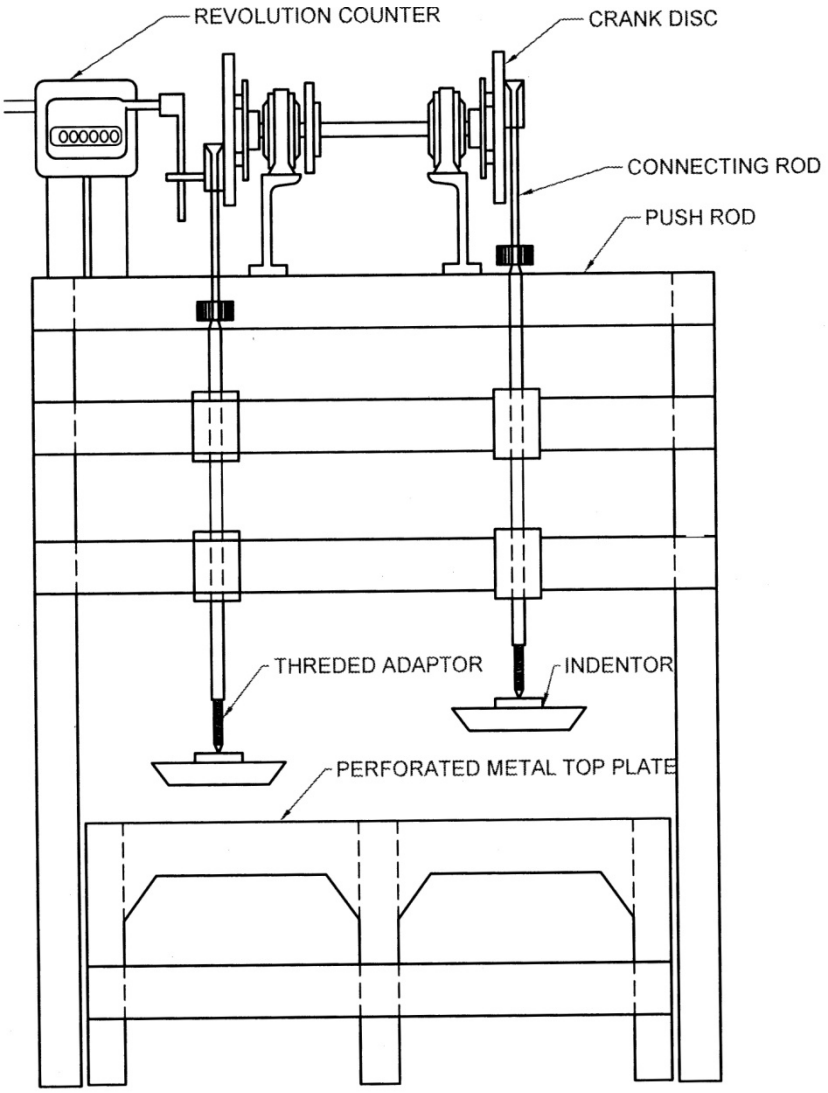

FIG. 2 APPARATUS FOR FLUXING TEST

ANNEX G

(*Clauses* 7. 5 *and* 7.6)

METHOD FOR DETERMINATION OF COMPRESSION SET

G-1 PRINCIPLE

The compression set under constant deflection is the measure of the residual strain in a test piece after it has been strained under compression to a given extent for a given time and then allowed to recover for a given time, the temperature being substantially constant during the test.

G-2 TEST SPECIMEN

The test specimen shall be of size 100 × 100 mm.

G-3 APPARATUS

The compression device shall consist of two flat steel plates, between the parallel faces of which the test piece is compressed. Steel spacers in the form of bars and of thickness such as to give the required 40 percent compression shall be provided to control the thickness of the piece during the test.

G-4 PROCEDURE

Measure accurately the initial thickness of the test piece as in **B-2**. Compress the test piece by 40 percent of its original thickness between the parallel steel plates, which shall be larger than the test piece. Use steel spacers between the plates, sufficient clearance being allowed for tilting of the test piece and care being taken to avoid displacement of the test piece. After being compressed for 22 h at a temperature of 70 ± 2°C, remove the test piece from the clamp while still at the test temperature and allow recovering for 3 h at room temperature. Then measure the thickness of the test piece again. Test at least two test pieces and take the average of test results.

G-5 CALCULATION

Calculate the compression set as follows:

$$\text{Compression set at constant} = (T_o - T_r) / T_o \times 100 \text{ strain, percent}$$

Where,

T_o = original thickness of the test piece, and

T_r = thickness of the test piece after recovery.

ANNEX H

(*Clause* 7.7)

METHOD FOR DETERMINATION OF *p*H VALUE

H-1 TEST SPECIMENS

Draw a square piece of rubberized coir sheet weighing about 10 g.

H-2 PREPARATION OFAQUEOUS EXTRACT

Cut the piece taken into about 5 mm^2 pieces and weigh. Transfer to a clean, chemically resistant glass flask, fitted with ground glass joint for reflux condenser. Add distilled water (*see* IS 1070) weighing 20 times the weight of the rubberized coir under test, to the flask. Fit the flask to the reflux condenser and heat the contents of the flask to boil. Continue boiling for 1 h. Remove the flask and close while the liquid is still boiling gently using a clean ground glass stopper. Cool to room temperature.

H-3 DETERMINATION OF *p*H VALUE

Transfer a portion of the aqueous extract to the electrode of *p*H meter (*see* IS 2711) and determine the *p*H.

ANNEX J

(*Clause* 7.8)

METHOD FOR DETERMINATION OF CHLORIDE

J-1 REAGENT

J-1.1 Calcium Carbonate (Chloride Free)

J-1.2 Standard Silver Nitrate Solution — 0.1 N.

J-1.3 Potassium Chromate Solution — 5 percent.

J-1.4 Burette

J-1.5 Pipette

J-1.6 Conical Flask

J-1.7 Measuring Flask

J-2 PREPARATION OF STANDARD SOLUTIONS

J-2.1 Standard Silver Nitrate Solution — 0.1 N. Take16.989 g of silver nitrate having molecular weight of 169.89 and dissolve in distilled water to make it one litre.

J-2.2 Potassium Chromate Solution — 5 Percent. Dissolve 50 g of potassium chromate in one litre distilled water.

J-3 PROCEDURE

J-3.1 For the potassium chromate solution prepared addstandard silver nitrate solution of 0.1 N till a red precipitate is formed. Allow it to stand for overnight and filter. Dilute the filter to one litre with distilled water. Note down the volume of silver nitrate solution transferred.

J-3.2 Take 100 ml of aqueous extract of the solutionwhich was prepared during *p*H analysis.

J-3.3 Neutralize with calcium carbonate till a pale yellowcolor is obtained (usually 0.5 g is sufficient).

J-3.4 Add 1 ml of potassium chromate solution.

J-3.5 Titrate against standard silver nitrate solution tilla red colour is obtained. Note down the volume of silver nitrate solution transferred.

J-3.6 Calculate the percentage of chloride by thefollowing formulae.

J-4 CALCULATION

$$\text{Chloride (as Cl), percent by mass} = \frac{3.546\,(V_1 - V_2)\,N}{W}$$

Where,

V_1 = volume of standard silver nitrate solutionused in titration with material, in ml;

V_2 = volume of standard silver nitrate solution used in blank with material, in ml;

N = normality of silver nitrate solution; and

W = mass of the material out of which the aqueous extract was made for chloride content test only, in g.

ANNEX K

(*Clause* 7.9)

METHOD FOR DETERMINATION OF SULPHATE CONTENT

K-1 REAGENTS

K-1.1Barium Chloride Solution, 2 percent (*w*/*v*).

K-1.2 Hydrochloric Acid (Concentrated)

K-2 PROCEDURE

K-2.1 Take a measured portion of extract. Filter through a suitable filter paper and wash the filter paper with distilled water. Add concentrated hydrochloric acid drop-by-drop to the combined filter and washing until the solution is just acidic to litmus, add 1 ml of acid per 100 ml of solution. Boil the solution for 5 min and leave it to cool overnight. Filter off any precipitate on a filter paper pulp pad. Wash with water and heat the combined filtrate and washing to boiling. To the boiling solution add drop-by-drop 10 ml of hot barium chloride solution. Boil for 30 min and leave to cool overnight. Transfer the precipitate quantitatively to an ignited tarred Gooch crucible

with asbestos pad and wash with cold water until the washing are free from chloride. Ignite the crucible and its contents gently at first and finally at 800°C to 900°C to constant weight.

NOTE — Whatman No. 41 paper is suitable

K-2.2 Carry out the blank determination.

K-3 CALCULATION

Calculate the percentage of water-soluble sulphateby the following formula:

$$P = \frac{2\,058 * (a - b)}{V}$$

Where,

P = percentage by weight, of water soluble sulphates as sulphate ion;

a = weight of the precipitate obtained as in test, in g;

b = weight of the precipitate obtained as in blank, in g; and

V = volume of extract taken for the test, in ml.

NOTE — 100 ml of extract are equivalent to 2.0 g of conditioned test specimen.

K-4 Repeat the test with extract of theremaining test specimens and calculate the percentage of water-soluble sulphate in each test specimen.

Calculate the average of the values obtained as in **K-3** and **K-4**.

ANNEX M

(*Foreword*)

COMMITTEE COMPOSITION

Coir and Coir Products Sectional Committee, TXD 25

Organization	*Representative(s)*
Central Coir Research Institute, Kalavoor	Dr Anita Das Ravindranath (***Chairman***) Smt Sumi Sebastian (*Alternate*)
Coir Pith and Allied Products Manufacturers and Exporters Association, Coimbatore	President Secretary (*Alternate*)
All India Rubberized Coir Products Manufacturers Association, Tirunelveli	Shri Sundaresan Shri Mathew George (*Alternate*)
Central Institute of Coir Technology, Bengaluru	Joint Director Senior Scientific Officer (*Alternate*)
Coconut Development Board, Ernakulam	Shri Sugata Ghosh Dr K Muralidharan (*Alternate*)
Coir board, Kochi	Secretary Joint Director (*Alternate*)
Coir Mats and Mattings Association,	Shri V. A. Joeph Shri Pavithran (*Alternate*)
Coir on Foam Products, Coimbatore	Shri Harirajan Shri Philip Varghese (*Alternate*)
Coir Shippers' Council, Cherthala	Shri K. S. Sanjeev Shri Sajan B Nair (*Alternate*)
Federation of Indian Coir Exporters' Associations, Alleppey	Shri Jospaul Mathew Shri Sajan B. Nair (*Alternate*)
Hindustan Coir, Coir Board Complex, Alappuzha	Weaving Master Senior Scientific Officer (*Alternate*)
Karnataka State Coir Development Corporation Ltd. Bengaluru	Shri G. Kumaraswamy Shri K. R. Kumaraswamy (*Alternate*)
Kerala Organic Manure and Fertilizer, Kerala	Shri G. Rajesh
Kerala State Coir Corporation Ltd, Alappuzha	Shri G. Sreekumar Shri N. Sunuraj (*Alternate*)
Kerala State Small Scale Coir Manufacturer's Federation, Alappuzha	President Secretary (*Alternate*)
Kerala State Coir Marketing Federation, Kerala	Shri Suresh Kumar
Kurlon Enterprises Limited, Bengaluru	Shri Narendra Kudva Shri P. Anil (*Alternate*)
M M Rubber & Co,	Shri Joseph Cheriyan
National Coir Research & Management Institute (NCRMI), Thiruvanthapuram	Dr K. R. Anil Shri C. Abhishek (*Alternate*)
National Coir Training & Design Centre,	Assistant Director Alappuzha Regional Officer (*Alternate*)
Natural Green Tech (P) Ltd.,	Shri Tommy Mathew Shri Abhishek Thomas (*Alternate*)
Orissa Co operative Coir Corporation Ltd, Bhubaneshwar	Managing Director General Manager (*Alternate*)

Organization	*Representative(s)*
Rubber Board, Kottayam	Dr J. Thomas Dr James Jacob (*Alternate*)
Shaa Pith Media Co., Coimbatore	Shri S Prabhu Shri Ramesh (*Alternate*)
Sivanthi Joe Coirs, Tuticorin	Shri Dunsten Joseph Shri K. Sivakar (*Alternate*)
Tamil Nadu Coir Cooperative Federation, Chennai	Managing Director General Manager (*Alternate*)
Venugopal Fibre Industries, Pattukottai	Shri R. B. Shyam Sunder
BIS Directorate General	Shri A. K. Bera, Scientist 'F' and Head (TXD) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri P. N. Murali
Scientist 'D' BIS

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